

AN 1989:87299 HCAPLUS

DN 110:87299

TI Preparation of amorphous calcium-magnesium phosphates at pH 7 and characterization by x-ray absorption and Fourier transform infrared spectroscopy

AU Holt, C.; Van Kemenade, M. J. J. M.; Harries, J. E.; Nelson, L. S.; Bailey, R. T.; Hukins, D. W. L.; Hasnain, S. S.; De Bruyn, P. L.

CS Hannah Res. Inst., Ayr, KA6 5HL, UK

SO J. Cryst. Growth (1988), 92(1-2), 239-52

CODEN: JCRGAE; ISSN: 0022-0248

DT Journal

LA English

CC 78-5 (Inorganic Chemicals and Reactions)

AB Amorphous Ca Mg phosphates were prepd. by pptn. from moderately supersatd. aq. solns. at pH 7. Chem. anal. of the samples by ion chromatog. showed that .ltoreq.50% of the phosphate ions were protonated, the proportion increasing with the Mg to Ca ion activity ratio in the soln. When left in contact with the supernatant, the amorphous ppts. matured to form the cryst. CaHPO4.2H2O. The amorphous phases were characterized by x-ray absorption spectroscopy and by Fourier transform IR spectroscopy and their properties compared with those of a basic amorphous tricalcium phosphate pptd. at pH 10. The x-ray absorption spectra near the K edge of Ca were very similar for all samples but there were differences in the IR spectra between the basic and the more acidic salts. In the phosphate stretching region, the main band of the more acidic materials occurred at higher wavenumber and was broader. Also there was a broad band of medium intensity at .apprx.890 cm-1 whereas there was virtually no absorption band in this region in the spectrum of amorphous Ca3(PO4)2. The acidic amorphous Ca phosphates may be useful as model compds. in describing some complex biol. Ca phosphates that form near neutral pH.

ST calcium magnesium phosphate amorphous; EXAFS

IT calcium magnesium phosphate amorphous

X-ray spectra

(EXAFS, of amorphous calcium magnesium phosphate)

IT 25618-23-9P, Calcium magnesium phosphate
119029-00-4P, Calcium magnesium hydroxide phosphate

RL: SPN (Synthetic preparation); PREP (Preparation)
(prepn. and EXAFS and IR spectra of amorphous)

IT 7778-77-0

RL: RCT (Reactant)
(reactions of, with calcium nitrate and magnesium nitrate)

Page 33

IT 10377-60-3, Magnesium dinitrate

RL: RCT (Reactant)

(reactions of, with potassium phosphate and calcium nitrate)

IT 10124-37-5, Calcium dinitrate

RL: RCT (Reactant)

(reactions of, with potassium phosphate and magnesium nitrate)

IT 119029-00-4P, Calcium magnesium hydroxide phosphate

RL: SPN (Synthetic preparation); PREP (Preparation)
(prepn. and EXAFS and IR spectra of amorphous)

RN 119029-00-4 HCAPLUS

CN Calcium magnesium hydroxide phosphate (9CI) (CA INDEX NAME)

Component	Ratio	Component
=====	=====	Registry Number
HO	x	14280-20 0
O4P		

AN 1996:514017 HCAPLUS

DN 125:204451

TI Preparation and characterization of magnesium-calcium hydroxyapatites

AU Yasukawa, Akemi; Ouchi, Satoshi; Kandori, Kazuhiko; Ishikawa, Tatsuo

CS Sch. Chem., Osaka Univ. Educ., Kashiwara, 582, Japan

SO Journal of Materials Chemistry (1996), 6(8), 1401-1405

CODEN: JMACEP; ISSN: 0959-9428

PB Royal Society of Chemistry

DT Journal

LA English

CC 63-7 (Pharmaceuticals)

Section cross-reference(s): 13

AB Magnesium-calcium hydroxyapatite (MgCaHAP)

solid solns. have been prepd. by a wet method from aq. solns. with different molar ratios, $Mg/(Mg + Ca)$, ranging from 0 to 0.5. The MgCaHAP particles formed were characterized by XRD, FTIR, TEM, ICP, TG-DTA and gas adsorption techniques. The $Mg/(Mg + Ca)$ ratios of the formed MgCaHAP particles were less than those of the starting solns. With increasing Mg content, the particles became less cryst. and agglomerates of the fine crystals and finally the products were amorphous at $Mg/(Mg + Ca) > 0.31$. The amt. of irreversible adsorption of CO_2 and CH_3OH showed a min. at a molar ratio $(Mg + Ca)/P$ of ca. 1.56, less than the stoichiometric ratio of 1.67.

ST magnesium calcium hydroxyapatite prepn

IT Adsorption

(prepn. and characterization of magnesium-calcium hydroxyapatites)

IT 67-56-1, Methanol, properties 124-38-9, Carbon dioxide, properties

RL: PRP (Properties)

(adsorption of; prepn. and characterization of magnesium-calcium hydroxyapatites)

IT 127836-54-8P, Calcium magnesium

hydroxide phosphate ((Ca,Mg)5(OH)(PO4)3)

RL: PRP (Properties); SPN (Synthetic preparation); THU (Therapeutic use); BIOL (Biological study); PREP (Preparation); USES (Uses)

(prepn. and characterization of magnesium-calcium hydroxyapatites)

IT 1305-62-0, Calcium hydroxide, reactions

7664-38-2, Phosphoric acid, reactions 10377-60-3,

Magnesium nitrate

RL: RCT (Reactant); RACT (Reactant or reagent)

(prepn. and characterization of magnesium-calcium hydroxyapatites)

IT 127836-54-8P, Calcium magnesium

hydroxide phosphate ((Ca,Mg)5(OH)(PO4)3)

RL: PRP (Properties); SPN (Synthetic preparation); THU (Therapeutic use); BIOL (Biological study); PREP (Preparation); USES (Uses)

(prepn. and characterization of magnesium-calcium hydroxyapatites)

RN 127836-54-8 HCAPLUS

CN Calcium magnesium hydroxide phosphate ((Ca,Mg)5(OH)(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
HO	1	14280-30-9
O4P	3	14265-44-2
Ca	0 - 5	7440-70-2
Mg	0 - 5	7439-95-4

IT 1305-62-0, Calcium hydroxide, reactions
10377-60-3, Magnesium nitrate

DN 125:204451
 TI Preparation and characterization of magnesium-calcium hydroxyapatites
 AU Yasukawa, Akemi; Ouchi, Satoshi; Kandori, Kazuhiko; Ishikawa, Tatsuo
 CS Sch. Chem., Osaka Univ. Educ., Kashiwara, 582, Japan
 SO Journal of Materials Chemistry (1996), 6(8), 1401-1405
 CODEN: JMACEP; ISSN: 0959-9428
 PB Royal Society of Chemistry
 DT Journal
 LA English
 CC 63-7 (Pharmaceuticals)
 Section cross-reference(s): 13
 AB **Magnesium-calcium hydroxyapatite (MgCaHAP)**
 solid solns. have been prep'd. by a wet method from aq. solns. with different molar ratios, $Mg/(Mg + Ca)$, ranging from 0 to 0.5. The MgCaHAP particles formed were characterized by XRD, FTIR, TEM, ICP, TG-DTA and gas adsorption techniques. The $Mg/(Mg + Ca)$ ratios of the formed MgCaHAP particles were less than those of the starting solns. With increasing Mg content, the particles became less cryst. and agglomerates of the fine crystals and finally the products were amorphous at $Mg/(Mg + Ca) > 0.31$. The amt. of irreversible adsorption of CO_2 and CH_3OH showed a min. at a molar ratio $(Mg + Ca)/P$ of ca. 1.56, less than the stoichiometric ratio of 1.67.
 ST **magnesium calcium hydroxyapatite** prepn
 IT Adsorption
 (prepn. and characterization of **magnesium-calcium hydroxyapatites**)
 IT 67-56-1, Methanol, properties 124-38-9, Carbon dioxide, properties
 RL: PRP (Properties)
 (adsorption of; prepn. and characterization of **magnesium-calcium hydroxyapatites**)
 IT 127836-54-8P, Calcium magnesium hydroxide phosphate $((Ca,Mg)_5(OH)(PO_4)_3)$
 RL: PRP (Properties); SPN (Synthetic preparation); THU (Therapeutic use); BIOL (Biological study); PREP (Preparation); USES (Uses)
 (prepn. and characterization of **magnesium-calcium hydroxyapatites**)
 IT 1305-62-0, Calcium hydroxide, reactions
 7664-38-2, Phosphoric acid, reactions 10377-60-3, Magnesium nitrate
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (prepn. and characterization of **magnesium-calcium hydroxyapatites**)
 IT 127836-54-8P, Calcium magnesium hydroxide phosphate $((Ca,Mg)_5(OH)(PO_4)_3)$
 RL: PRP (Properties); SPN (Synthetic preparation); THU (Therapeutic use); BIOL (Biological study); PREP (Preparation); USES (Uses)
 (prepn. and characterization of **magnesium-calcium hydroxyapatites**)
 RN 127836-54-8 HCAPLUS
 CN Calcium magnesium hydroxide phosphate $((Ca,Mg)_5(OH)(PO_4)_3)$ (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
HO	1	14280-30-9
O4P	3	14265-44-2
Ca	0 - 5	7440-70-2
Mg	0 - 5	7439-95-4

IT 1305-62-0, Calcium hydroxide, reactions
 10377-60-3, Magnesium nitrate
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (prepn. and characterization of **magnesium-calcium hydroxyapatites**)

AN 1996:514017 HCAPLUS
 DN 125:204451
 TI Preparation and characterization of magnesium-calcium hydroxyapatites
 AU Yasukawa, Akemi; Ouchi, Satoshi; Kandori, Kazuhiko; Ishikawa, Tatsuo
 CS Sch. Chem., Osaka Univ. Educ., Kashiwara, 582, Japan
 SO Journal of Materials Chemistry (1996), 6(8), 1401-1405
 CODEN: JMACEP; ISSN: 0959-9428
 PB Royal Society of Chemistry
 DT Journal
 LA English
 CC 63-7 (Pharmaceuticals)
 Section cross-reference(s): 13
 AB **Magnesium-calcium hydroxyapatite** (MgCaHAP)
 solid solns. have been prepd. by a wet method from aq. solns. with different molar ratios, $Mg/(Mg + Ca)$, ranging from 0 to 0.5. The MgCaHAP particles formed were characterized by XRD, FTIR, TEM, ICP, TG-DTA and gas adsorption techniques. The $Mg/(Mg + Ca)$ ratios of the formed MgCaHAP particles were less than those of the starting solns. With increasing Mg content, the particles became less cryst. and agglomerates of the fine crystals and finally the products were amorphous at $Mg/(Mg + Ca) > 0.31$. The amt. of irreversible adsorption of CO_2 and CH_3OH showed a min. at a molar ratio $(Mg + Ca)/P$ of ca. 1.56, less than the stoichiometric ratio of 1.67.
 ST **magnesium calcium hydroxyapatite** prepn
 IT Adsorption
 (prepn. and characterization of **magnesium-calcium hydroxyapatites**)
 IT 67-56-1, Methanol, properties 124-38-9, Carbon dioxide, properties
 RL: PRP (Properties)
 (adsorption of; prepn. and characterization of **magnesium-calcium hydroxyapatites**)
 IT 127836-54-8P, Calcium magnesium hydroxide phosphate ((Ca,Mg)5(OH)(PO4)3)
 RL: PRP (Properties); SPN (Synthetic preparation); THU (Therapeutic use); BIOL (Biological study); PREP (Preparation); USES (Uses)
 (prepn. and characterization of **magnesium-calcium hydroxyapatites**)
 IT 1305-62-0, Calcium hydroxide, reactions
 7664-38-2, Phosphoric acid, reactions 10377-60-3, **Magnesium nitrate**
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (prepn. and characterization of **magnesium-calcium hydroxyapatites**)
 IT 127836-54-8P, Calcium magnesium hydroxide phosphate ((Ca,Mg)5(OH)(PO4)3)
 RL: PRP (Properties); SPN (Synthetic preparation); THU (Therapeutic use); BIOL (Biological study); PREP (Preparation); USES (Uses)
 (prepn. and characterization of **magnesium-calcium hydroxyapatites**)
 RN 127836-54-8 HCAPLUS
 CN Calcium magnesium hydroxide phosphate ((Ca,Mg)5(OH)(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
HO	1	14280-30-9
O4P	3	14265-44-2
Ca	0 - 5	7440-70-2
Mg	0 - 5	7439-95-4

IT 1305-62-0, Calcium hydroxide, reactions
 10377-60-3, **Magnesium nitrate**
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (prepn. and characterization of **magnesium-calcium**)

L108 ANSWER 11 OF 17 HCAPLUS COPYRIGHT 2002 ACS
 AN 1996:514017 HCAPLUS
 DN 125:204451
 TI Preparation and characterization of **magnesium-calcium hydroxyapatites**
 AU Yasukawa, Akemi; Ouchi, Satoshi; Kandori, Kazuhiko; Ishikawa, Tatsuo
 CS Sch. Chem., Osaka Univ. Educ., Kashiwara, 582, Japan
 SO Journal of Materials Chemistry (1996), 6(8), 1401-1405
 CODEN: JMACEP; ISSN: 0959-9428
 PB Royal Society of Chemistry
 DT Journal
 LA English
 CC 63-7 (Pharmaceuticals)
 Section cross-reference(s): 13
 AB **Magnesium-calcium hydroxyapatite** (MgCaHAP) solid solns. have been prepd. by a wet method from aq. solns. with different molar ratios, **Mg/(Mg + Ca)**, ranging from 0 to 0.5. The MgCaHAP particles formed were characterized by XRD, FTIR, TEM, ICP, TG-DTA and gas adsorption techniques. The **Mg/(Mg + Ca)** ratios of the formed MgCaHAP particles were less than those of the tarting solns. With increasing **Mg** content, the particles became less cryst. and agglomerates of the fine crystals and finally the products were amorphous at **Mg/(Mg + Ca) > 0.31**. The amt. of irreversible adsorption of CO₂ and CH₃OH showed a min. at a molar ratio (**Mg + Ca**)/P of ca. 1.56, less than the stoichiometric ratio of 1.67.
 ST **magnesium calcium hydroxyapatite** prepn
 IT Adsorption
 (prepn. and characterization of **magnesium-calcium hydroxyapatites**)
 IT 67-56-1, Methanol, properties 124-38-9, Carbon dioxide, properties
 RL: PRP (Properties)
 (adsorption of; prepn. and characterization of **magnesium-calcium hydroxyapatites**)
 IT 127836-54-8P, Calcium magnesium hydroxide phosphate ((Ca,Mg)5(OH)(PO4)3)
 RL: PRP (Properties); SPN (Synthetic preparation); THU (Therapeutic use); BIOL (Biological study); PREP (Preparation); USES (Uses)
 (prepn. and characterization of **magnesium-calcium hydroxyapatites**)
 IT 1305-62-0, Calcium hydroxide, reactions
 7664-38-2, Phosphoric acid, reactions 10377-60-3, **Magnesium nitrate**
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (prepn. and characterization of **magnesium-calcium hydroxyapatites**)
 IT 127836-54-8P, Calcium magnesium hydroxide phosphate ((Ca,Mg)5(OH)(PO4)3)
 RL: PRP (Properties); SPN (Synthetic preparation); THU (Therapeutic use); BIOL (Biological study); PREP (Preparation); USES (Uses)
 (prepn. and characterization of **magnesium-calcium hydroxyapatites**)
 RN 127836-54-8 HCAPLUS
 CN Calcium magnesium hydroxide phosphate ((Ca,Mg)5(OH)(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
HO	1	14280-30-9
O4P	3	14265-44-2
Ca	0 - 5	7440-70-2
Mg	0 - 5	7439-95-4

IT 1305-62-0, Calcium hydroxide, reactions
 10377-60-3, **Magnesium nitrate**
 RL: RCT (Reactant); RACT (Reactant or reagent)

DN 115:263521
 TI Manufacture of ceramic coated with calcium phosphate
 as artificial bones
 IN Tsuzuki, Masaji; Miyata, Eiji; Hattori, Masaaki; Miura, Kazunori; Kondo,
 Kazuo
 PA NGK Spark Plug Co., Ltd., Japan
 SO Jpn. Kokai Tokkyo Koho, 6 pp.
 CODEN: JKXXAF
 DT Patent
 LA Japanese
 IC ICM C04B041-87
 ICS A61L027-00
 ICA C04B035-00
 CC 63-7 (Pharmaceuticals)
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 03137079	A2	19910611	JP 1989-272191	19891019
	JP 07074109	B4	19950809		

AB A ceramic coated with Ca phosphate is prepd. for use
 in manufg. biocompatible artificial bone. A sintered ceramic is coated
 with a mixt. of hydroxylapatite and Ca3(PO4)2 (the wt.
 ratio from 4/1 to 1/5), or coated with a mixt. of hydroxylapatite
 and Mg phosphate (the wt. ratio 50/1 to 50/5).

ST ceramic calcium phosphate artificial bone

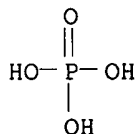
IT Bone
 (artificial, manuf. of, with ceramic materials coated with

IT hydroxylapatite and tricalcium phosphate)
 Dental materials and appliances
 Prosthetic materials and Prosthetics
 (implants, manuf. of, with ceramic materials coated with
 hydroxylapatite and tricalcium phosphate)
 IT 124097-42-3 137524-23-3
 RL: BIOL (Biological study)
 (ceramic coating with, in artificial bone manuf.)
 IT 137524-23-3
 RL: BIOL (Biological study)
 (ceramic coating with, in artificial bone manuf.)
 RN 137524-23-3 HCAPLUS
 CN Phosphoric acid, magnesium salt, mixt. with hydroxylapatite
 (Ca5(OH)(PO4)3) (9CI) (CA INDEX NAME)

CM 1

CRN 10043-83-1

CMF H3 O4 P . x Mg



x Mg

CM 2

CRN 1306-06-5

CMF Ca . H O . O4 P

CCI MNS, TIS

CDES 8:IN,MN,HYDROXYLAPATITE

CM 3

DN 115:263521
 TI Manufacture of ceramic coated with calcium phosphate
 as artificial bones
 IN Tsuzuki, Masaji; Miyata, Eiji; Hattori, Masaaki; Miura, Kazunori; Kondo,
 Kazuo
 PA NGK Spark Plug Co., Ltd., Japan
 SO Jpn. Kokai Tokkyo Koho, 6 pp.
 CODEN: JKXXAF
 DT Patent
 LA Japanese
 IC ICM C04B041-87
 ICS A61L027-00
 ICA C04B035-00
 CC 63-7 (Pharmaceuticals)
 FAN.CNT 1

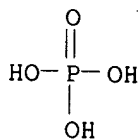
	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 03137079	A2	19910611	JP 1989-272191	19891019
	JP 07074109	B4	19950809		

AB A ceramic coated with Ca phosphate is prepd. for use
 in manufg. biocompatible artificial bone. A sintered ceramic is coated
 with a mixt. of hydroxylapatite and Ca₃(PO₄)₂ (the wt.
 ratio from 4/1 to 1/5), or coated with a mixt. of hydroxylapatite
 and Mg phosphate (the wt. ratio 50/1 to 50/5).
 ST ceramic calcium phosphate artificial bone
 IT Bone
 (artificial, manuf. of, with ceramic materials coated with

hydroxylapatite and tricalcium phosphate)
 IT Dental materials and appliances
 Prosthetic materials and Prosthetics
 (implants, manuf. of, with ceramic materials coated with
 hydroxylapatite and tricalcium phosphate)
 IT 124097-42-3 137524-23-3
 RL: BIOL (Biological study)
 (ceramic coating with, in artificial bone manuf.)
 IT 137524-23-3
 RL: BIOL (Biological study)
 (ceramic coating with, in artificial bone manuf.)
 RN 137524-23-3 HCAPLUS
 CN Phosphoric acid, magnesium salt, mixt. with hydroxylapatite
 (Ca₅(OH)(PO₄)₃) (9CI) (CA INDEX NAME)

CM 1

CRN 10043-83-1
 CMF H3 O4 P . x Mg



x Mg

CM 2

CRN 1306-06-5
 CMF Ca . H O . O4 P
 CCI MNS, TIS
 CDES 8:IN,MN,HYDROXYLAPATITE

L108 ANSWER 2 OF 17 HCAPLUS COPYRIGHT 2002 ACS

AN 2001:658827 HCAPLUS

DN 136:330502

TI Precipitation of **magnesium apatite** on pure
magnesium surface during immersing in Hank's solutionAU Kuwahara, Hideyuki; Al-Abdullat, Yousef; Mazaki, Naoko; Tsutsumi, Sadami;
Aizawa, Tatsuhiko

CS Research Institute for Applied Sciences, Kyoto, 606-8202, Japan

SO Materials Transactions (2001), 42(7), 1317-1321

CODEN: MTARCE; ISSN: 1345-9678

PB Japan Institute of Metals

DT Journal

LA English

CC 63-7 (Pharmaceuticals)

AB A new artificial bone concept by **magnesium** alloys is proposed to think much importance on its homogenization with a surrounding natural hard and soft tissue. **Magnesium** is an essential element for human body, so that **magnesium** bone implants can be expected to be toxicity free even though **magnesium** dissolved into human soft tissue. In addn., **magnesium** base artificial bone has vivo-adaptively to growing bone cells once vivo-coating is formed on the surface of **magnesium** in the inside of soft tissue. In the present paper, its chem. behavior in Hank's soln. (HBSS (+)) is described to simulate biochem. reactions of **magnesium** in the human body. An effect of heat treatment of **magnesium** on its chem. behavior is also investigated. Specimens of 10.times.20 .times. 2 mm³ were used for examg. chem. behaviors of com. grade pure **magnesium** (3N-Mg) in a HBSS (+) for various holding time (25-700 h). Specific mass gain of each specimen was measured, the surface microstructure was obsd. by a scanning electron microscope, identification of reaction products were examd. by x-ray diffraction measurements. Chem. compns. of reaction products were also analyzed by an energy dispersion x-ray spectrometry. Mass change of heat-treated 3N-Mg, which was heat-treated at 803 K for 90 ks increased with immersing time in HBSS (+) though that of other heat-treated 3N-Mg unstably decreased in HBSS (+). **Magnesium** reacted with HBSS (+) and then a **magnesium apatite** was pptd. on the heat-treated 3N-Mg specimen surface. The **magnesium apatite** should be described as $(\text{Ca}_{0.86}\text{Mg}_{0.14})_{10}(\text{PO}_4)_6(\text{OH})_2$.

ST **magnesium apatite** bone implant

IT Bone

(artificial; pptn. of **magnesium apatite** on pure
magnesium surface for bone implants)

IT Prosthetic materials and Prosthetics

(implants; pptn. of **magnesium apatite** on pure
magnesium surface for bone implants)

IT Heat treatment

(pptn. of **magnesium apatite** on pure
magnesium surface during immersing in Hank's soln.)

IT Apatite-group minerals

RL: PRP (Properties); THU (Therapeutic use); BIOL (Biological study); USES
(Uses)

(pptn. of **magnesium apatite** on pure
magnesium surface for bone implants)

IT 7439-95-4, **Magnesium**, biological studies

RL: PEP (Physical, engineering or chemical process); PYP (Physical
process); THU (Therapeutic use); BIOL (Biological study); PROC (Process);
USES (Uses)

(pptn. of **magnesium apatite** on pure
magnesium surface during immersing in Hank's soln.)

IT 412319-78-9, **Calcium magnesium hydroxide****phosphate** $(\text{Ca}_{4.3}\text{Mg}_{0.7}(\text{OH})(\text{PO}_4)_3)$

RL: PRP (Properties); THU (Therapeutic use); BIOL (Biological study); USES
(Uses)

HO		14280-30-9
O4P		14265-44-2
Ca	4.3	7440-70-2
Mg	0.7	7439-95-4

L108 ANSWER 3 OF 17 HCAPLUS COPYRIGHT 2002 ACS

AN 2001:621137 HCAPLUS

DN 136:8516

TI Synthesis of Ca-Mg apatite via a
mechanochemical hydrothermal process

AU Liao, Jiefan; Hamada, Kenji; Senna, Mamoru

CS Nara Machinery Co., Ltd., Tokyo, 143-0002, Japan

SO Journal of Materials Synthesis and Processing (2000), 8(5/6), 305-311
CODEN: JMSPEI; ISSN: 1064-7562

PB Kluwer Academic/Plenum Publishers

DT Journal

LA English

CC 49-4 (Industrial Inorganic Chemicals)

Section cross-reference(s): 63

AB Mixts. of calcium and magnesium hydroxides
and calcium dihydrogen phosphate in various molar

ratios were ground in water with a fine grinding machine, which features multi-ring grinding media. Mechanochem. amorphization of the mixts. occurs quickly by grinding. The mixts., after grinding for 5, 20, and 60 min, were then subjected to hydrothermal treatment at 573 K for 24 h. The influence of Mg/(Mg + Ca) molar ratio on the thermal behavior of the mech. activated powders and the structure of the final products has been investigated. The microhomogeneity of Mg, Ca, and P elements on the samples is enhanced by the mechanochem. treatment. A shift in the x-ray diffraction peaks was obsd. among the final products with different grinding times, presumably due to a partial substitution of calcium by magnesium.

ST calcium magnesium apatite synthesis
mechanochem hydrothermal process

IT 1305-62-0, Calcium hydroxide, processes

1306-06-5D, Hydroxylapatite, magnesium-contg.

1309-42-8, Magnesium hydroxide

7758-23-8, Calcium dihydrogen phosphate

303955-04-6, Calcium magnesium

hydroxide phosphate [Ca4Mg(OH)(PO4

)3] 303955-05-7, Calcium magnesium

hydroxide phosphate [Ca5Mg5(OH)2(PO4

)6] 374930-58-2, Calcium magnesium

hydroxide phosphate (Ca1.5Mg3.5(OH)(

PO4)3)

RL: PEP (Physical, engineering or chemical process); PROC (Process)

(synthesis of calcium magnesium apatite,

by mechanochem. hydrothermal process)

RE.CNT 22 THERE ARE 22 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

(1) Aizawa, M; Mater Res Bull 1999, V34, P1215 HCAPLUS

(2) Bigi, A; Acta Crystallogr 1996, VB52, P87 HCAPLUS

(3) Chaikina, M; Chem Sustainable Develop 1998, V6, P135

(4) Chiranjeevirao, S; Inorg Chim Acta 1982, V67, P183 HCAPLUS

(5) Hamada, K; J Mater Sci 1996, V31, P1725 HCAPLUS

(6) Hashimoto, K; Phosphorus Lett 1999, V34, P16 HCAPLUS

(7) Heinicke, G; Tribochemistry 1984, P303

(8) Kanazawa, T; Inorganic Phosphorus Chemistry 1985, P79

(9) Klement, R; Z Anorg Allg Chem 1995, V336, P113

(10) Komatsubara, S; J Amer Ceram Soc 1994, V77, P278 HCAPLUS

(11) Liao, J; Chem Sustainable Develop 1998, V6, P233

(12) Liao, J; Thermochim Acta 1992, V197, P295 HCAPLUS

(13) Monma, H; Challenging to Future Advanced Materials Aiming for Intelligence
and Harmonization 1995, V1, P561

(14) Motooka, I; Topics in Phosphorus Chemistry 1980, V10, P171 HCAPLUS

(15) Okazaki, M; J Osaka Univ Dent School 1994, V34, P73 HCAPLUS

L108 ANSWER 2 OF 17 HCAPLUS COPYRIGHT 2002 ACS

AN 2001:658827 HCAPLUS

DN 136:330502

TI Precipitation of **magnesium apatite** on pure
magnesium surface during immersing in Hank's solutionAU Kuwahara, Hideyuki; Al-Abdullat, Yousef; Mazaki, Naoko; Tsutsumi, Sadami;
Aizawa, Tatsuhiko

CS Research Institute for Applied Sciences, Kyoto, 606-8202, Japan

SO Materials Transactions (2001), 42(7), 1317-1321

CODEN: MTARCE; ISSN: 1345-9678

PB Japan Institute of Metals

DT Journal

LA English

CC 63-7 (Pharmaceuticals)

AB A new artificial bone concept by **magnesium** alloys is proposed to think much importance on its homogenization with a surrounding natural hard and soft tissue. **Magnesium** is an essential element for human body, so that **magnesium** bone implants can be expected to be toxicity free even though **magnesium** dissolved into human soft tissue. In addn., **magnesium** base artificial bone has vivo-adaptively to growing bone cells once vivo-coating is formed on the surface of **magnesium** in the inside of soft tissue. In the present paper, its chem. behavior in Hank's soln. (HBSS (+)) is described to simulate biochem. reactions of **magnesium** in the human body. An effect of heat treatment of **magnesium** on its chem. behavior is also investigated. Specimens of 10.times.20 .times. 2 mm³ were used for examg. chem. behaviors of com. grade pure **magnesium** (3N-Mg) in a HBSS (+) for various holding time (25-700 h). Specific mass gain of each specimen was measured, the surface microstructure was obsd. by a scanning electron microscope, identification of reaction products were examd. by x-ray diffraction measurements. Chem. compns. of reaction products were also analyzed by an energy dispersion x-ray spectrometry. Mass change of heat-treated 3N-Mg, which was heat-treated at 803 K for 90 ks increased with immersing time in HBSS (+) though that of other heat-treated 3N-Mg unstably decreased in HBSS (+). **Magnesium** reacted with HBSS (+) and then a **magnesium apatite** was pptd. on the heat-treated 3N-Mg specimen surface. The **magnesium apatite** should be described as $(\text{Ca}_{0.86}\text{Mg}_{0.14})_{10}(\text{PO}_4)_6(\text{OH})_2$.

ST **magnesium apatite** bone implant

IT Bone

(artificial; pptn. of **magnesium apatite** on pure
magnesium surface for bone implants)

IT Prosthetic materials and Prosthetics

(implants; pptn. of **magnesium apatite** on pure
magnesium surface for bone implants)

IT Heat treatment

(pptn. of **magnesium apatite** on pure
magnesium surface during immersing in Hank's soln.)

IT Apatite-group minerals

RL: PRP (Properties); THU (Therapeutic use); BIOL (Biological study); USES
(Uses)(pptn. of **magnesium apatite** on pure
magnesium surface for bone implants)IT 7439-95-4, **Magnesium**, biological studiesRL: PEP (Physical, engineering or chemical process); PYP (Physical
process); THU (Therapeutic use); BIOL (Biological study); PROC (Process);
USES (Uses)(pptn. of **magnesium apatite** on pure
magnesium surface during immersing in Hank's soln.)IT 412319-78-9, **Calcium magnesium hydroxide****phosphate** $(\text{Ca}_{4.3}\text{Mg}_{0.7}(\text{OH})(\text{PO}_4)_3)$ RL: PRP (Properties); THU (Therapeutic use); BIOL (Biological study); USES
(Uses)

L108 ANSWER 12 OF 17 HCAPLUS COPYRIGHT 2002 ACS

AN 1996:145667 HCAPLUS

DN 124:216642

TI Rietveld structure refinements of calcium hydroxylapatite containing magnesium

AU Bigi, A.; Falini, G.; Foresti, E.; Gazzano, M.; Ripamonti, A.; Roveri, N.

CS Dip. Chim. 'G. Ciamician' Cent. Studio Fis. Macromolecole, Univ. Studi Bologna, Bologna, I-40126, Italy

SO Acta Crystallographica, Section B: Structural Science (1996), B52(1), 87-92

CODEN: ASBSDK; ISSN: 0108-7681

PB Munksgaard

DT Journal

LA English

CC 75-8 (Crystallography and Liquid Crystals)

AB The crystal structures of four hydroxylapatite (HA) samples prepd. from solns. in the presence of 10, 15, 25 and 30 Mg-atom-% were studied by x-ray powder pattern fitting. The total Mg content of the solid samples, as detd. by chem. anal., was 4.9, 14.1, 20.4 and 30.6 Mg-atom-%, resp. Rietveld anal. was performed using the computer program PREFIN implemented with routines which allow the refinements of the av. crystallite sizes. Different refinement procedures were carried out to evaluate the effect of the amorphous and background profiles on the occupancy factor data. For comparison, Mg-free hydroxylapatite was refined with the same strategies. The results of the different approaches indicate that the degree of Mg substitution for Ca in the HA structure can be at most appr. 10 atom-%. Mg substitutes Ca preferentially at the 6(h) site. The broadening of the

diffraction peaks increases on increasing the total Mg content in the solid phase, which is always significantly higher than the amt. incorporated into the HA structure. The excess is probably located in the amorphous phase and/or on the crystallite surface.

ST structure calcium magnesium hydroxylapatite crystal

IT Crystal structure (of magnesium-substituted calcium hydroxylapatite)

IT 127836-54-8, Calcium magnesium hydroxide phosphate ((Ca,Mg)5(OH)(PO4)3)

RL: PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process)

(Rietveld refinements of crystal structure of)

IT 127836-54-8, Calcium magnesium hydroxide phosphate ((Ca,Mg)5(OH)(PO4)3)

RL: PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process)

(Rietveld refinements of crystal structure of)

RN 127836-54-8 HCAPLUS

CN Calcium magnesium hydroxide phosphate ((Ca,Mg)5(OH)(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component	Registry Number
H ₂ O	1		14280-30-9
	3		14265-44-2
	0.5		7440-70-2
	0.5		7439-95-4

L100 ANSWER 12 OF 17 HCAPLUS
 AN 1996:145667 HCAPLUS
 DN 124:216642
 TI Rietveld structure refinements of **calcium hydroxylapatite** containing **magnesium**
 AU Bigi, A.; Falini, G.; Foresti, E.; Gazzano, M.; Ripamonti, A.; Roveri, N.
 CS Dip. Chim. 'G. Ciamician' Cent. Studio Fis. Macromolecole, Univ. Studi
 Bologna, Bologna, I-40126, Italy
 SO Acta Crystallographica, Section B: Structural Science (1996), B52(1),
 87-92
 CODEN: ASBSDK; ISSN: 0108-7681

PB Munksgaard
 DT Journal
 LA English
 CC 75-8 (Crystallography and Liquid Crystals)
 AB The crystal structures of four **hydroxylapatite** (HA) samples
 prepd. from solns. in the presence of 10, 15, 25 and 30 **Mg**
 -atom-% were studied by x-ray powder pattern fitting. The total
Mg content of the solid samples, as detd. by chem. anal., was 4.9,
 14.1, 20.4 and 30.6 **Mg**-atom-%, resp. Rietveld anal. was
 performed using the computer program PREFIN implemented with routines
 which allow the refinements of the av. crystallite sizes. Different
 refinement procedures were carried out to evaluate the effect of the
 amorphous and background profiles on the occupancy factor data. For
 comparison, **Mg**-free **hydroxylapatite** was refined with
 the same strategies. The results of the different approaches indicate
 that the degree of **Mg** substitution for **Ca** in the Ha
 structure can be at most .apprx.10 atom-%. **Mg** substitutes
Ca preferentially at the 6(h) site. The broadening of the

diffraction peaks increases on increasing the total **Mg** content
 in the solid phase, which is always significantly higher than the amt.
 incorporated into the HA structure. The excess is probably located in the
 amorphous phase and/or on the crystallite surface.

ST structure **calcium magnesium hydroxylapatite**
 crystal

IT Crystal structure
 (of **magnesium**-substituted **calcium**
hydroxylapatite)

IT 127836-54-8, **Calcium magnesium hydroxide**
phosphate ((Ca,Mg)5(OH)(PO4
)3)

RL: PEP (Physical, engineering or chemical process); PRP (Properties);
 PROC (Process)

(Rietveld refinements of crystal structure of)

IT 127836-54-8, **Calcium magnesium hydroxide**
phosphate ((Ca,Mg)5(OH)(PO4
)3)

RL: PEP (Physical, engineering or chemical process); PRP (Properties);
 PROC (Process)

(Rietveld refinements of crystal structure of)

RN 127836-54-8 HCAPLUS

CN **Calcium magnesium hydroxide phosphate** ((Ca,Mg)5(OH)(PO4)3) (9CI) (CA
 INDEX NAME)

Component	Ratio	Component Registry Number
HO	1	14280-30-9
O4P	3	14265-44-2
Ca	0 - 5	7440-70-2
Mg	0 - 5	7439-95-4

L108 ANSWER 13 OF 17 HCAPLUS COPYRIGHT 2002 ACS

AN 1991:663521 HCAPLUS

DN 115:263521

TI Manufacture of ceramics coated with **calcium phosphate**
 as artificial bones

IN Tsuzuki, Masaji; Miyata, Eiji; Hattori, Masaaki; Miura, Kazunori; Kondo,

L100 ANSWER 12 OF 17 HCAPLUS
 AN 1996:145667 HCAPLUS
 DN 124:216642
 TI Rietveld structure refinements of **calcium hydroxylapatite** containing **magnesium**
 AU Bigi, A.; Falini, G.; Foresti, E.; Gazzano, M.; Ripamonti, A.; Roveri, N.
 CS Dip. Chim. 'G. Ciamician' Cent. Studio Fis. Macromolecole, Univ. Studi
 Bologna, Bologna, I-40126, Italy
 SO Acta Crystallographica, Section B: Structural Science (1996), B52(1),
 87-92
 CODEN: ASBSDK; ISSN: 0108-7681

PB Munksgaard
 DT Journal
 LA English
 CC 75-8 (Crystallography and Liquid Crystals)
 AB The crystal structures of four **hydroxylapatite** (HA) samples
 prepd. from solns. in the presence of 10, 15, 25 and 30 **Mg**
 -atom-% were studied by x-ray powder pattern fitting. The total
Mg content of the solid samples, as detd. by chem. anal., was 4.9,
 14.1, 20.4 and 30.6 **Mg**-atom-%, resp. Rietveld anal. was
 performed using the computer program PREFIN implemented with routines
 which allow the refinements of the av. crystallite sizes. Different
 refinement procedures were carried out to evaluate the effect of the
 amorphous and background profiles on the occupancy factor data. For
 comparison, **Mg**-free **hydroxylapatite** was refined with
 the same strategies. The results of the different approaches indicate
 that the degree of **Mg** substitution for **Ca** in the Ha
 structure can be at most .apprx.10 atom-%. **Mg** substitutes
Ca preferentially at the 6(h) site. The broadening of the

diffraction peaks increases on increasing the total **Mg** content
 in the solid phase, which is always significantly higher than the amt.
 incorporated into the HA structure. The excess is probably located in the
 amorphous phase and/or on the crystallite surface.

ST structure **calcium magnesium hydroxylapatite**
 crystal

IT Crystal structure
 (of **magnesium**-substituted **calcium**
hydroxylapatite)

IT 127836-54-8, **Calcium magnesium hydroxide**
phosphate ((**Ca**,**Mg**)5(**OH**)(**PO4**
)3)

RL: PEP (Physical, engineering or chemical process); PRP (Properties);
 PROC (Process)

(Rietveld refinements of crystal structure of)

IT 127836-54-8, **Calcium magnesium hydroxide**
phosphate ((**Ca**,**Mg**)5(**OH**)(**PO4**
)3)

RL: PEP (Physical, engineering or chemical process); PRP (Properties);
 PROC (Process)

(Rietveld refinements of crystal structure of)

RN 127836-54-8 HCAPLUS

CN **Calcium magnesium hydroxide phosphate** ((**Ca**,**Mg**)5(**OH**)(**PO4**)3) (9CI) (CA
 INDEX NAME)

Component	Ratio	Component Registry Number
HO	1	14280-30-9
O4P	3	14265-44-2
Ca	0 - 5	7440-70-2
Mg	0 - 5	7439-95-4

L108 ANSWER 13 OF 17 HCAPLUS COPYRIGHT 2002 ACS

AN 1991:663521 HCAPLUS

DN 115:263521

TI Manufacture of ceramics coated with **calcium phosphate**
 as artificial bones

IN Tsuzuki, Masaji; Miyata, Eiji; Hattori, Masaaki; Miura, Kazunori; Kondo,

L108 ANSWER 12 OF 17 HCAPLUS
 AN 1996:145667 HCAPLUS
 DN 124:216642
 TI Rietveld structure refinements of **calcium hydroxylapatite** containing **magnesium**
 AU Bigi, A.; Falini, G.; Foresti, E.; Gazzano, M.; Ripamonti, A.; Roveri, N.
 CS Dip. Chim. 'G. Ciamician' Cent. Studio Fis. Macromolecole, Univ. Studi
 SO Bologna, Bologna, I-40126, Italy
 Acta Crystallographica, Section B: Structural Science (1996), B52(1),
 87-92
 CODEN: ASBSDK; ISSN: 0108-7681

PB Munksgaard
 DT Journal
 LA English
 CC 75-8 (Crystallography and Liquid Crystals)
 AB The crystal structures of four **hydroxylapatite** (HA) samples
 prepd. from solns. in the presence of 10, 15, 25 and 30 **Mg**
 -atom-% were studied by x-ray powder pattern fitting. The total
Mg content of the solid samples, as detd. by chem. anal., was 4.9,
 14.1, 20.4 and 30.6 **Mg**-atom-%, resp. Rietveld anal. was
 performed using the computer program PREFIN implemented with routines
 which allow the refinements of the av. crystallite sizes. Different
 refinement procedures were carried out to evaluate the effect of the
 amorphous and background profiles on the occupancy factor data. For
 comparison, **Mg**-free **hydroxylapatite** was refined with
 the same strategies. The results of the different approaches indicate
 that the degree of **Mg** substitution for **Ca** in the Ha
 structure can be at most .apprx.10 atom-%. **Mg** substitutes
Ca preferentially at the 6(h) site. The broadening of the

diffraction peaks increases on increasing the total **Mg** content
 in the solid phase, which is always significantly higher than the amt.
 incorporated into the HA structure. The excess is probably located in the
 amorphous phase and/or on the crystallite surface.

ST structure **calcium magnesium hydroxylapatite**
 crystal

IT Crystal structure
 (of **magnesium**-substituted **calcium**
hydroxylapatite)

IT 127836-54-8, **Calcium magnesium hydroxide**
phosphate ((Ca,Mg)5(OH)(PO4)
)3)

RL: PEP (Physical, engineering or chemical process); PRP (Properties);
 PROC (Process)

(Rietveld refinements of crystal structure of)

IT 127836-54-8, **Calcium magnesium hydroxide**
phosphate ((Ca,Mg)5(OH)(PO4)
)3)

RL: PEP (Physical, engineering or chemical process); PRP (Properties);
 PROC (Process)

(Rietveld refinements of crystal structure of)

RN 127836-54-8 HCAPLUS

CN **Calcium magnesium hydroxide phosphate** ((Ca,Mg)5(OH)(PO4)3) (9CI) (CA
 INDEX NAME)

Component	Ratio	Component Registry Number
HO	1	14280-30-9
O4P	3	14265-44-2
Ca	0 - 5	7440-70-2
Mg	0 - 5	7439-95-4

L108 ANSWER 13 OF 17 HCAPLUS COPYRIGHT 2002 ACS

AN 1991:663521 HCAPLUS

DN 115:263521

TI Manufacture of ceramics coated with **calcium phosphate**
 as artificial bones

IN Tsuzuki, Masaji; Miyata, Eiji; Hattori, Masaaki; Miura, Kazunori; Kondo,